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Antioxidant Profiling Of Bambusa Arundinacea Mother Tincture: Implications For Health And Wellness

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Abstract

This study aimed to investigate the antioxidant properties of Bambusa arundinacea mother tincture and assess its potential implications for health and wellness. This study utilized three distinct assays, namely, DPPH radical scavenging activity, nitric oxide scavenging activity, and superoxide scavenging activity, to comprehensively evaluate the antioxidant capabilities of the mother tincture. The research findings revealed that Bambusa arundinacea mother tincture exhibited substantial antioxidant activity across all three assays. However, among these assays, the DPPH radical scavenging activity demonstrated the highest antioxidant potential. This indicates that the mother tincture has a remarkable ability to neutralize free radicals, particularly DPPH radicals, which are known for their detrimental effects on cellular health. These findings have significant implications for health and wellness, as antioxidants play a crucial role in protecting cells from oxidative stress and related diseases. Incorporating Bambusa arundinacea mother tincture into dietary or therapeutic regimens may contribute to enhancing overall well-being and reducing the risk of oxidative damage-related health conditions.

This research study provides valuable insights into the antioxidant profile of Bambusa arundinacea mother tincture, emphasizing its potential as a natural source of antioxidants with promising health and wellness implications. Further investigations and clinical studies are warranted to explore its therapeutic applications and establish its efficacy in promoting human health.

Introduction

Antioxidants play a pivotal role in maintaining health by combating the detrimental effects of oxidative stress. Oxidative stress arises from an imbalance between the production of reactive oxygen species (ROS) and the body's ability to neutralize them. When ROS production exceeds the body's defense mechanisms, it can lead to cellular damage and contribute to various chronic diseases. [1] Homoeopathic medicine, a holistic approach to healing, has gained attention for its potential antioxidant properties. While homeopathic remedies are highly diluted substances, they are believed to stimulate the body's self-healing mechanisms. Several homoeopathic medicines have been explored for their antioxidant activity, and research in this domain continues to evolve. [2] Bambusa arundinacea mother tincture, for instance, is one such homoeopathic medicine derived from the bamboo plant. [3] It has been the subject of research to explore its antioxidant potential. Preliminary studies suggest that Bambusa arundinacea mother tincture may possess antioxidant properties, but further investigation is needed to validate these claims and understand the underlying mechanisms. The antioxidant activity of homoeopathic medicines is often assessed using established methods and assays. These evaluations aim to determine the ability of these medicines to scavenge free radicals and reduce oxidative stress. Some homoeopathic medicines derived from plant sources have shown promising antioxidant effects. [4]

In recent years, there has been a growing interest in the potential antioxidant properties of natural substances, including plant-derived remedies. Bambusa arundinacea, commonly known as bamboo, has been recognized for its therapeutic properties in traditional medicine systems, including Homeopathy. Homeopathy, a holistic system of medicine, utilizes highly diluted substances to stimulate the body's innate healing processes. Bambusa arundinacea mother tincture, derived from the bamboo plant, is believed to possess medicinal properties, and anecdotal evidence suggests its potential antioxidant effects. [5]

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The scientific evidence supporting the antioxidant properties of Bambusa arundinacea mother tincture remains limited and warrants thorough investigation. This study aims to bridge this knowledge gap by conducting a comprehensive assessment of the antioxidant activity of Bambusa arundinacea mother tincture. The findings of this research endeavor may contribute to a better understanding of the potential health benefits associated with this homeopathic remedy and its role in oxidative stress management. To achieve this objective, we will employ a range of established methods and assays to evaluate the antioxidant capacity of Bambusa arundinacea mother tincture. Furthermore, we will explore the underlying mechanisms by which this homeopathic medicine exerts its antioxidant effects at a molecular level. The outcomes of this study have the potential to not only expand our knowledge of the therapeutic properties of Bambusa arundinacea but also shed light on the broader implications for the utilization of homeopathic medicines in healthcare. Ultimately, this research aims to contribute to evidence-based practice and provide valuable insights into the realm of complementary and alternative medicine.

Materials and methods:

Antioxidant Activity:

The antioxidant activity of the Bambusa arundinacea mother tincture were determined using the DPPH free radical scavenging assay, Nitric oxide radical scavenging assay and Superoxide anion scavenging assay.

DPPH radical scavenging activity:

The free radical scavenging activity of the fractions was assessed in vitro using the 2,2′-diphenyl-1-picrylhydrazyl (DPPH) assay, following the standard procedure outlined by Williams et al. in 1995. To prepare the stock solution, 24 mg of DPPH was dissolved in 100 ml of ethanol, and this solution was stored at -20°C until needed. The working solution was prepared by diluting the DPPH solution with ethanol, and a 3 ml aliquot of this working solution was mixed with 1 ml of the sample at various concentrations (20, 30, and 40 µg/ml).

The reaction mixture was thoroughly shaken and incubated in the dark for 15 minutes at room temperature. Subsequently, the absorbance of the mixture was measured at a wavelength of 517 nm. A control sample was prepared without any sample, and the scavenging activity was determined as a percentage of DPPH radical scavenging, calculated using the following equation:

$$\boldsymbol{Percentage\ of\ Inhibition} = \frac{(\boldsymbol{Control\ OD - Sample\ OD})}{\boldsymbol{Control\ OD}} \times \mathbf{100}$$

This assay allowed for the evaluation of the antioxidant properties of the fractions by measuring their ability to scavenge DPPH radicals.

Nitric oxide radical scavenging activity

Nitric oxide radical scavenging activity was assessed using the Griess Ilosvay reaction with sodium nitroprusside as the substrate. In a typical experimental setup, a reaction mixture was prepared, comprising 2 mL of sodium nitroprusside solution (10 mM) and 0.5 mL of phosphate buffer (pH 7.4). To this mixture, 0.5 mL of the test sample or vitamin-C was added, and the reaction was allowed to incubate for 150 minutes at a temperature of 25°C. Following the incubation period, 0.5 mL of nitrite was extracted from the reaction mixture, and subsequently, 1 mL of sulfanilic acid reagent was added. The sulfanilic acid reagent was prepared by dissolving 0.33% sulfanilic acid in a 2% glacial acetic acid solution. This mixture was allowed to sit for 5 minutes. Afterward, 1 mL of 1% naphthyl ethylene diamine dihydrochloride (NEDD) was introduced into the reaction mixture and left to stand for an additional 30 minutes at 25°C.

The absorbance of the resulting pink-colored solution was measured at a wavelength of 540 nm using a spectrophotometer. The percentage of nitric oxide inhibition was calculated using the following equation:

$$\%\ \boldsymbol{of\ Nitric\ Oxide\ Scavening\ assay} = \frac{(\boldsymbol{A0 - A1})}{\boldsymbol{A0}} \times \mathbf{100}$$

where A0 was the absorbance of control, and A1 was the absorbance of the treated sample.

Superoxide Scavenging Activity

The analysis of superoxide anion radical scavenging activity was conducted using the riboflavin-light-NBT system, as described by Beauchamp and Fridovich in 1971. To perform this assay, 1 ml of the plant extract was collected at various concentrations (20, 40, 60, 80, and 100 µg/ml). This extract was then combined with 0.1 ml

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of Riboflavin solution (20 µg), 0.2 ml of EDTA solution (12 mM), 0.2 ml of methanol, and 0.1 ml of Nitro-blue tetrazolium (0.5 mM) in a test tube. The reaction mixture was subsequently diluted to a final volume of 3 ml with a phosphate buffer (50 mM).

Following a 20-minute incubation period at room temperature, the absorbance of the solution was measured at 560 nm. Ascorbic acid was employed as a standard for reference. The scavenging capability of the plant extract was determined using the following equation:

$$\textbf{\textit{Scavenging Effect}} = \frac{(\textbf{\textit{Control OD}} - \textbf{\textit{Sample OD}})}{\textbf{\textit{Control OD}}} \times \mathbf{100}$$

Results and discussion:

DPPH radical scavenging activity:

The Antioxidant Activity of DPPH radical scavenging assay, concentrations of 20 µg/ml, 200 µg/ml, and 400 µg/ml were tested and the results were tabulated in **Table 1**. The study assessed the antioxidant potential of Bambusa arundinacea mother tincture in comparison to the standard, Ascorbic acid. The results are presented as mean values with their respective standard deviations. At a concentration of 20 µg/ml, Ascorbic acid exhibited an antioxidant activity with a value of 39.505 ± 0.056. In contrast, Bambusa arundinacea mother tincture demonstrated a slightly higher antioxidant activity with a value of 51.949 ± 0.687.

When the concentration was increased to 200 µg/ml, the antioxidant activity of Ascorbic acid improved to 66.349 ± 0.005, while Bambusa arundinacea mother tincture showed an antioxidant activity of 74.783 ± 0.005, indicating a stronger scavenging potential. At the highest concentration tested, 400 µg/ml, Ascorbic acid exhibited an antioxidant activity of 96.84 ± 0.035, while Bambusa arundinacea mother tincture maintained a robust antioxidant activity of 86.804 ± 0.005. Furthermore, the IC_{50} value, which represents the concentration of a substance required to scavenge 50% of the DPPH radicals, was determined. For Bambusa arundinacea mother tincture, the IC_{50} value was calculated to be 17.847, indicating its efficient radical scavenging capability. In comparison, the standard, Ascorbic acid, had an IC50 value of 23.873, suggesting that Bambusa arundinacea mother tincture may possess a more potent antioxidant effect in this assay.

Table 1: DPPH radical scavenging activity

Sample	**Concentration**			**IC_{50} Value**
	20 µg/ ml	*200 µg/ ml*	*40 µg/ ml*	
Bambusa arundinacea mother tincture	51.949 ± 0.687	74.783 ± 0.005	86.804 ± 0.005	17.847
Standard (Ascorbic acid)	39.505 ± 0.056	66.349 ± 0.005	96.84 ± 0.035	23.873

These results shown in **Fig 1** indicate that Bambusa arundinacea mother tincture exhibits promising antioxidant activity in the DPPH radical scavenging assay, potentially making it a valuable candidate for further investigation and development as a natural antioxidant product. The study findings provide valuable insights into the potential health benefits of Bambusa arundinacea in combating oxidative stress. [6]

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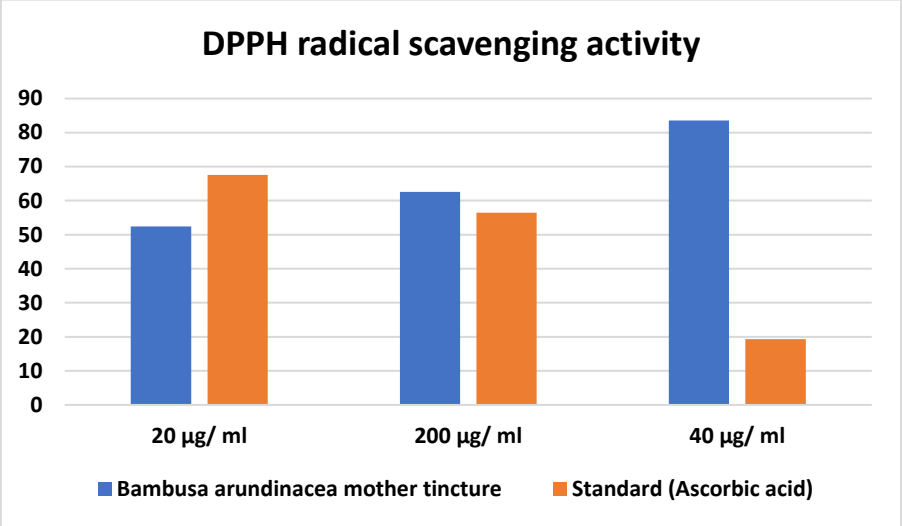

Fig 1: DPPH radical scavenging activity

Nitric oxide radical scavenging activity

The Antioxidant Activity of Nitric Oxide Radical Scavenging Assay was conducted at different concentrations of 20 µg/ml, 200 µg/ml, and 400 µg/ml. In this study, the standard antioxidant, Ascorbic acid, was used for comparison. The results are as shown in **Fig 2** and tabulated in **Table 2**.

At a concentration of 20 µg/ml: Ascorbic acid exhibited an antioxidant activity with a value of 72.437 ± 0.027. Bambusa arundinacea mother tincture showed an antioxidant activity of 46.878 ± 0.15. At a concentration of 200 µg/ml: Ascorbic acid displayed an antioxidant activity with a value of 86.484 ± 0.006. Bambusa arundinacea mother tincture exhibited an antioxidant activity of 56.097 ± 0.188. At a concentration of 400 µg/ml: Ascorbic acid demonstrated an antioxidant activity with a value of 98.216 ± 0.006. Bambusa arundinacea mother tincture showed an antioxidant activity of 96.607 ± 0.128.

Table 2: Nitric Oxide radical scavenging activity

Sample	**Concentration**			**IC_{50} Value**
	20 µg/ ml	*200 µg/ ml*	*40 µg/ ml*	
Bambusa arundinacea mother tincture	46.878 ± 0.15	56.097 ± 0.188	96.607 ± 0.128	23.353
Standard (Ascorbic acid)	72.437 ± 0.027	86.484 ± 0.006	98.216 ± 0.006	2.33

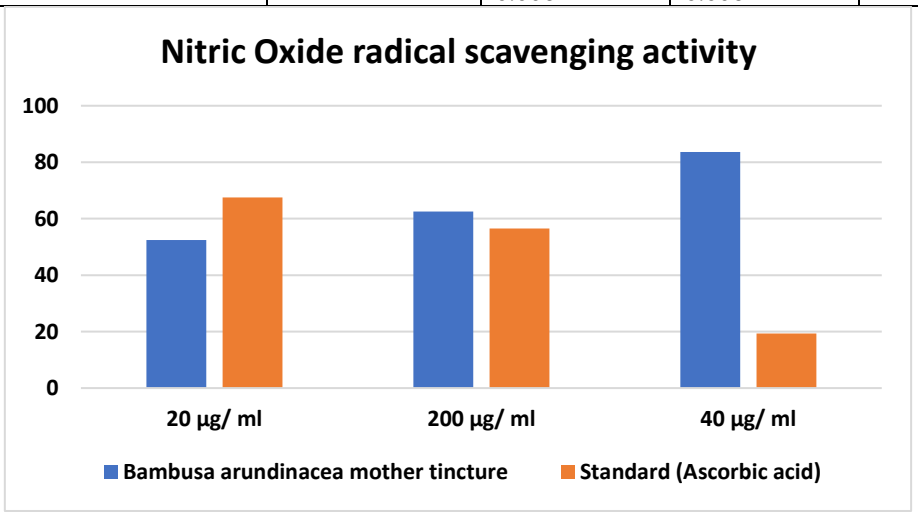

Fig 2: Nitric Oxide radical scavenging activity

The IC_{50} value, which represents the concentration at which 50% of the radical scavenging activity is achieved, was calculated for Bambusa arundinacea mother tincture as 23.353. In contrast, the standard Ascorbic acid had an IC_{50} value of 2.33. [7]

Superoxide scavenging activity

The antioxidant activity of Bambusa arundinacea mother tincture in comparison to the standard, Ascorbic acid, through a Superoxide Scavenging Activity assay. Three different concentrations, namely 20 µg/ml, 200 µg/ml, and 400 µg/ml, were evaluated for both the standard and the Bambusa arundinacea mother tincture. The results demonstrated that Ascorbic acid exhibited superoxide scavenging activity with values of 67.527 ± 0.017, 56.506 ± 0.012, and 19.3 ± 0.033 at the respective concentrations of 20 µg/ml, 200 µg/ml, and 400 µg/ml.

In comparison, Bambusa arundinacea mother tincture exhibited superoxide scavenging activity with values of 52.412 ± 0.063, 62.541 ± 0.238, and 83.572 ± 0.052 at the same concentrations. Notably, the mother tincture demonstrated higher superoxide scavenging activity than the standard Ascorbic acid at all three concentrations tested. Furthermore, the IC50 value, which represents the concentration required to scavenge 50% of superoxide radicals, was calculated. The IC_{50} value for Bambusa arundinacea mother tincture was determined to be 19.598, while the IC_{50} value for Ascorbic acid was 29.078.

This finding in **Fig 3** suggests that Bambusa arundinacea mother tincture possesses a more potent superoxide scavenging activity compared to Ascorbic acid, indicating its potential as a natural antioxidant agent. These results underscore the potential therapeutic value of Bambusa arundinacea mother tincture as an antioxidant, warranting further investigation and consideration in the field of public health and natural medicine. [8]

Table 3: *Superoxide* scavenging activity

Sample	**Concentration**			**IC_{50} Value**
	20 µg/ ml	*200 µg/ ml*	*40 µg/ ml*	
Bambusa arundinacea mother tincture	52.412 ± 0.063	62.541 ± 0.238	83.572 ± 0.052	19.598
Standard (Ascorbic acid)	67.527 ± 0.017	56.506 ± 0.012	19.3 ± 0.033	29.078

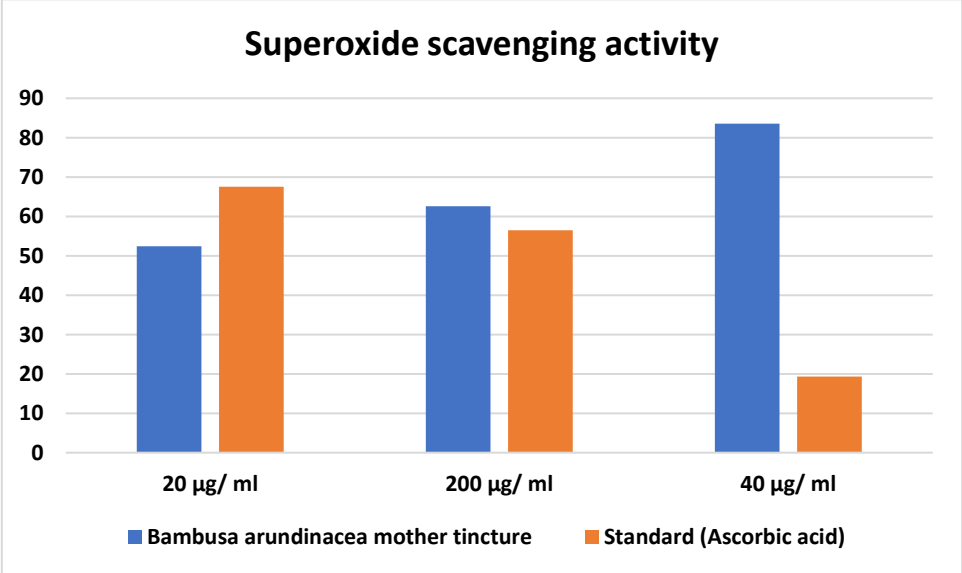

Fig 3: Superoxide scavenging activity

Conclusion:

The present study sought to investigate the antioxidant properties of Bambusa arundinacea mother tincture and shed light on its potential implications for health and wellness. Through the utilization of three distinct assays—namely, DPPH radical scavenging activity, nitric oxide scavenging activity, and superoxide scavenging

activity—our research comprehensively assessed the antioxidant capabilities of this botanical extract. The findings of this investigation unequivocally demonstrate that Bambusa arundinacea mother tincture exhibits substantial antioxidant activity across all three assays. Of particular note, the DPPH radical scavenging activity assay revealed the highest antioxidant potential among the tested parameters. This observation underscores the remarkable ability of the mother tincture to neutralize free radicals, with a particular focus on DPPH radicals, known for their deleterious impact on cellular health.

These research findings carry profound implications for the realms of health and wellness, as antioxidants occupy a pivotal role in safeguarding cells against oxidative stress and the associated spectrum of diseases. The capacity of Bambusa arundinacea mother tincture to counteract oxidative damage suggests its potential as a valuable addition to dietary or therapeutic regimens, with the promise of enhancing overall well-being and mitigating the risk of health conditions rooted in oxidative stress. u

This study has contributed significant insights into the antioxidant profile of Bambusa arundinacea mother tincture, accentuating its potential as a natural source of antioxidants with promising implications for human health and wellness. The avenues for future exploration and clinical investigations are evident, as we embark on a journey to uncover the full spectrum of therapeutic applications and efficacy of this botanical extract in promoting human health. Our research serves as a stepping stone towards harnessing the benefits of Bambusa arundinacea mother tincture in the pursuit of improved well-being and a healthier, more resilient human population.

References:

1. Lei XG, Zhu JH, Cheng WH, Bao Y, Ho YS, Reddi AR, Holmgren A, Arnér ES. Paradoxical roles of antioxidant enzymes: basic mechanisms and health implications. Physiological reviews. 2016 Jan;96(1):307-64.
2. Pinto S, Rao AV, Rao A. Lipid peroxidation, erythrocyte antioxidants and plasma antioxidants in osteoarthritis before and after homeopathic treatment. Homeopathy. 2008 Oct;97(04):185-9.
3. Wulfsohn TB. A group analysis of the Graminae (grass) plant family of homeopathic remedies (Doctoral dissertation).
4. Joshi V, Joshi RP. Some plants used in ayurvedic and homoeopathic medicine. Journal of Pharmacognosy and Phytochemistry. 2013;2(1):269-75.
5. Thakur M, Sobti R, Kaur T. Medicinal and biological potential of Thuja occidentalis: A comprehensive review. Asian Pacific Journal of Tropical Medicine. 2023 Apr 1;16(4):148-61.
6. Brand-Williams W, Cuvelier ME, Berset CL. Use of a free radical method to evaluate antioxidant activity. LWT-Food science and Technology. 1995 Jan 1;28(1):25-30.
7. Ali BM, Boothapandi M, Nasar AS. Nitric oxide, DPPH and hydrogen peroxide radical scavenging activity of TEMPO terminated polyurethane dendrimers: Data supporting antioxidant activity of radical dendrimers. Data in brief. 2020 Feb 1;28:104972.
8. Beauchamp C, Fridovich I. Superoxide dismutase: improved assays and an assay applicable to acrylamide gels. Analytical biochemistry. 1971 Nov 1;44(1):276-87.
9. Kattimani V, Panga GS, Gnanavel S, Saravanan D, Chintalapati NH. Natural Oral Care Products for the Treatment of Stomatitis. Pharmacological Studies in Natural Oral Care. 2023 Oct 3:311-56.